DOCUMENT RESUME

ED 094 702 IR 000 883

AUTHOR	Spencer, Carol
TITLE	How to Allocate Personnel Costs of Reference.
INSTITUTION	College of Physicians of Philadelphia, Pa.
PUB DATE	Jul 74
NOTE	8p.; Paper presented at the American Library Association Annual Conference (93rd, New York, New York, July 7-13, 1974)
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	Estimated Costs; *Librarians; Library Associations; *Library Automation; *Library Expenditures; *Library Reference Services; Medical Record Librarians; *Symposia; Unit Costs; University Libraries
IDENTIFIERS	American Library Association; Library College Physicians Philadelphia; Pennsylvania; Philadelphia

ABSTRACT

In July 1974, at the American Library Association Convention, a symposium on reference measurement was held. The basic premise was that work sampling and random time sampling with self-observation were the best methods of allocating personnel costs of reference services at the Library of the College of Physicians of Philadelphia. First, reasons were given for the need of cost information. Then, alternative ways of allocating personnel costs were determined. Next, the advantages and disadvantages of different methods used to determine personnel costs were analyzed. The diary method as well as the accurate but expensive and complex method of cost accounting were rejected. Work and random time sampling were found to give reliability at low cost, minimal interference with service operations, and little distortion of collected data to the collecting process. The immediate practical finding was the minimum price that could be charged for a computer search. Most of all, it was learned how much better it was to sample activities, rather than to keep masses of data on all operations. Best of all, the method could be carried out by library managers. (WCM)

ED 094702

HOW TO ALLOCATE PERSONNEL COSTS OF REFERENCE

Symposium on Reference Measurement, American Library Assoc. Convention, July 8, 1974

Carol Spencer, Deputy Chief, Reference Services Division, National Library of Medicine, Bethesda, Md.

(Work described here was done at the Library of the College of Physicians of Philadelphia, Phila., Pa.)

BEST COPY AVAILABLE

Why should we try to allocate costs of reference service? There are at least four reasons: Cost information is needed for performance monitoring & improvement in efficiency of performance; it is needed in allocation of limited resources to cover unlimited needs; it is needed for price setting & cost recovery, where labor is the largest element; and fourth, it is needed for responsible policy formulation, the reconciliation of our objectives with our resources.

In what ways (among what alternatives) may we allocate personnel costs?

1. By type of reference question: ready reference, citation verification, subject search
2. Type of user: primary client, affiliate, student, general public
3. Type of source: directory, textbook, review, computer on-line service
4. Type of labor: professional/subprofessional, subject specialist/librarian, experienced/novice
5. Subject area: science, core medicine, dentistry, nursing,
6. Query route: in-person, telephone, mail, teletype
7. Query purpose: education, research, patient care, publication
8. Process step: question negotiation, search, write-up

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

We can measure whatever is pertinent & useful to the particular library. Whatever the categories, they should be carefully defined & mutually exclusive. The essential is to identify & define. Whatever can be defined can be measured or counted.

IR 000 883

BEST COPY AVAILABLE

What methods can be used to determine personnel costs, and what are the advantages & disadvantages of each? The method most often employed in library cost studies, & the one that appears to be the simplest, is the diary method. The employee records the amount of time spent on each task done during the working day. Since the method depends on human memory, it is inaccurate. It is burdensome to the worker, and, if conscientiously followed, it interferes with the performance of his work. Most often, however, the entries for the day's work are made at the end of the day, and are mere guesses.

Another method is time-study, wherein an observer with a stopwatch determines the exact amount of time required for an employee to do a specific task. The method is accurate, & very reliable for short-cycle, repetitive tasks, & for individual activity. However, it requires a trained observer for each worker, which is expensive. These trained observers are often unfamiliar with the implications of library operating procedures & may produce disappointing results. Time-study interferes with normal operations; the continuous observation annoys workers, & the observation process itself changes the thing being observed. It is unsuitable for nonrepetitive tasks such as most reference tasks.

A third method is work sampling, making random observations of workers & recording what is being done at the moment of observation. The result is a sample of the day's tasks and the percentage of time spent on each. No trained observers are needed. The method can meet predetermined standards of accuracy & reliability. Work sampling is more reliable for long- and variable-length cycle activity, and for group activity. It causes minimal interference with service & minimal distortion due to the data collecting process. A single observer can cover several workers. Observations car be made over a period of days or weeks.

The most accurate & comprehensive method for allocating personnel costs is continuous cost accounting. Here every working time period is charged against an appropriate product or process account number, and daily time cards are needed. Such a method gives the most complete information on labor & other system costs. It is expensive & complex; it must be undertaken for the long term. It requires a large institutional investment, & is beyond the reach of most libraries.

At the College of Physicians, we concluded that for most library operations, the technique of choice was work sampling, random time sampling with self-observation. This method gave acceptable reliability at low cost, and minimal interference with service operations & little distortion of collected data due to the collecting process. Best of all, the method could be carried out by library managers themselves.

Requirements for a work sampling study. First, we must identify & list all work elements we wish to count or measure. Then we must carefully define all these work elements.

Second, we must design a recording form for the observations and for the output. For examples, see Figures A and B. In doing this, we should consider the number of activities involved & the number of people involved. We must make sure that the categories are mutually exclusive. Always include an "other" category, so that 100% of the time can be accounted for. We must also design an analogous output form to record the performance indicators, i.e. requests per day, etc.

Third, select the frequency of observations (per day). In doing this, consider the inherent variability of the worker & the activity, the nature of the activity (short or long cycle, repetitive or unique), the physical limits of the working area & the number of observers available, the time limits, & the resources available.

Fourth, determine the proper sample size, the minimum number of observations needed. A random time sample, one in which each minute of the working day has an equal chance of being selected, will tend to represent the proportions of the actual worker's day which are spent on different tasks. The accuracy of the representation will depend on the number of observations made. Figure C shows tables & formula for determining sample size & error.

Fifth, in addition to every minute of the working day having an equal chance of being chosen, there must be no delay between the chosen minute & the recording of the activity. There are two ways to accomplish this:

(1) We can use a number of Random Alarm Mechanisms (RAMs). These are small pocket size electronic devices that buzz at random intervals, signalling the worker to record what he is doing at the moment. He records this by checking the appropriate item on a short list of mutually exclusive tasks. RAMs can be purchased for $80-125 each. For supplier's address, see Figure D.

(2) If RAMs are not available, a list of sampling times derived from a table of random numbers can be used. Figure E shows such a table of random sampling times. A signal can be given to all workers simultaneously, or to the workers within one observer's field of vision. The same type of recording list can be used.

When scheduling a study, avoid grossly atypical periods of service demand, such as school vacations or final exams, & the peak of employee absenteeism during blizzards or flu epidemics.

Instructions to employees. Oral & written instructions to participating personnel should include an explanation of the purpose of the study, and a definition of the elements of interest. The concept must be sold to all workers. Reference people usually have not thought about their work from this particular point of view.

Employees should be told that when the signal is heard, they should make a check mark in the appropriate block on the time sheet, the block corresponding to what they were doing at the time of the signal.

Calculations. First, the work distribution. When sampling is complete, count the number of times each element has been checked & so calculate the percentage of time spent on each element.

Next, the cost of this time. The effective daily wage for each worker is equal to his annual salary plus fringe benefits (employer's contributions to social security, pension, hospital & group insurance) all divided by the number of days per year actually worked; that is (for a 5-day week) 260 days minus vacation, sick leave, holidays, lunch hours, & coffee breaks. The daily costs of each employee's time for each element can then be summed for all workers; the resulting figure can then be divided by the output units (number of citations verified, etc.) to get the unit labor cost per element. Add salary plus fringes and divide by productive time.

Results. Some results from a short study done by this method at the Library of the College of Physicians of Philadelphia during the spring of 1972 may be of interest:

Type of reference question	Unit labor cost
Directory information	$ 2.43
Citation verification	3.29
Location of documents not in library	1.69
Specific data, simple fact	5.50
Subject literature search, manual	38.02
" " " , computer	4.39 - 6.65

Costs included question negotiation, search strategy formulation, & searching time.

It was obvious that we could not afford to provide manual literature searches for all our users, unless on a fee basis, since the College serves about 1300 member physicians, and, as part of a nationwide medical library network, also serves about 800 health science institutions.

What we learned from this study. The immediate practical finding was the minimum price we should charge for a computer search, and how much the librarians' efficiency was increased after intensive training. Results suggested possible improvements in the search process which might increase efficiency & decrease cost. We had an indication of the relative effectiveness of individual librarians, & their efficiency at each type of reference question compared to the average of all our librarians. We learned the number & types of reference questions done, & the average time spent on each. Our subjective feeling about the advisability of providing manual literature searches was confirmed. Results suggested where the best areas might be to cut services if budget cuts should make that necessary.

Most of all, we learned how much better it is to sample activities, rather than to keep masses of useless data on all operations, and how satisfactory it is to have a study method which can be carried out by librarians themselves.

Reference Timesheet

RAM # _____

Date _____

Name _____

Question type:	Time of signal:
Directory	
Verification	
Location	
Specific data	
Subject search computer, off-line	
computer, on-line	
manual	
Other	

A. Recording sheet for time sampling study on reference personnel

Reference Output Form

Date _____

Name _____

Question type:	Number:
Directory	
Verification	
Location	
Data	
Subject search computer off-line	
computer on-line	
manual	
Other output	

B. Output sheet for reference cost study

C. How the number of required observations (n) varies in relation to the percentage occurrence of the element and the accuracy desired.

Percentage of occurrence of observed event = p		Sample size, number of observations (n) at 95% confidence, for absolute error (L) of		
p	(1-p)	L = 1%	L = 5%	L = 10%
.01	.99	400		
.05	.95	1,900		
.10	.90	3,600	145	
.20	.80	6,400	255	
.30	.70	8,400	335	
.40	.60	9,600	385	
.50	.50	10,000	400	100

Use formula $L = 2\sqrt{\frac{p(1-p)}{n}}$

At 95% confidence the absolute error for an event observed 20% of the time with 100 observations is

$$L = 2\sqrt{\frac{(.20)(.80)}{100}} = 2\sqrt{\frac{.16}{100}} = .08 = 8\%$$

D. Electronic Ideas, Inc. 2218 Cotner Ave., Los Angeles, Calif. 90064 (213) 477-4217

E. Table of Random Sampling Times. (If working day begins at 9:00 a.m., the first sampling time of the first column, 0 05, would be interpreted as 9:05 a.m.; the second, 0 20, as 9:20 a.m.)

Day 1	2	3	4	5	6	7
0 05	0 20	0 10	0 15	0 05	0 10	0 15
0 20	0 50	0 35	0 25	0 25	0 25	0 20
0 55	1 20	0 55	1 20	0 45	0 30	0 35
1 10	1 45	1 00	1 40	1 05	0 40	0 50
1 20	1 55	1 10	1 55	1 50	1 10	1 00
1 35	2 00	1 45	2 00	2 10	1 20	1 25
2 30	2 30	2 00	2 30	2 20	1 30	1 40
3 05	2 40	2 05	2 50	2 30	2 25	1 50
3 10	3 10	2 45	3 10	2 35	2 35	1 55
3 15	3 30	2 50	3 30	2 50	2 40	2 45
3 25	3 40	3 00	3 45	3 00	2 55	3 05
3 45	3 50	3 20	3 50	3 10	3 05	3 50
4 00	4 05	3 30	4 30	3 40	3 15	4 00
4 10	4 15	4 40	4 40	3 45	3 25	4 25
4 35	4 20	4 45	5 10	4 30	3 30	4 45
4 55	4 25	4 55	5 20	5 00	3 40	5 00
5 00	4 30	5 00	5 30	5 45	3 50	5 10
5 05	4 35	5 55	5 45	5 50	4 00	5 15
5 35	5 20	6 00	5 50	5 55	4 15	6 20
5 55	5 35	6 05	6 15	6 00	4 25	6 25
6 20	6 15	6 35	6 20	6 35	4 35	6 50
6 45	6 40	6 40	6 25	6 45	5 40	6 55
6 50	6 45	7 10	6 50	7 00	6 45	7 15
7 10	7 10	7 35	7 30	7 45	6 55	7 40
7 25	7 35	7 50	7 55	7 55	7 35	7 45

How to Allocate Personnel Costs of Reference - C. Spencer, Deputy Chief, Reference Services Division, National Library of Medicine 8600 Rockville Pike Bethesda, Md. 20014